

REMARKS

The present response is intended to be fully responsive to all points of rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Claims 1-63 are pending in this case. Claims 6-14, 19-25, 27-28, 33-34, 44, 54-62 are objected to. Claims 1, 15, 18, 26, 35, 37-41, 43, 46-47, 49, 63 have been rejected under 35 U.S.C. § 102(e). Claims 2-5, 16-17, 29-32, 36, 42, 45, 48, 50-53 have been rejected under 35 U.S.C. § 103(a). Independent claims 1, 19, 35, 49 and dependent claims 5-7, 13, 23-25, 27, 32-34, 39-40, 53-55, 61 have been amended. Claims 6-14, 19-25, 27-28, 33-34, 44, 54-62 would be allowed if objections are overcome.

Response to Objection to the Specification

The Examiner objected to the disclosure because on page 20, line 10, the inner decoder is mislabeled. Applicant has amended the specification to indicate reference numeral 134 rather than 143 which was incorrect. No new matter has been added.

Response to Drawing Objections

The Examiner objected to the drawings under 37 CFR 1.84(p)(5) because they include several reference numerals not mentioned in the specification. Applicant has amended the specification to include these reference numerals without adding new matter. Applicant submits that the drawings now comply with 37 CFR 1.84(p)(5).

Replacement Drawing Sheets

Applicant submits two replacement drawing sheets of Figures 6, 9 to correct typographical errors. In particular, regarding Figure 6, duplicate reference numerals 142 has been corrected wherein the Noise Power Function has been given reference numeral 143. Regarding Figure 9, the term "CONDITIONAL CODING" in block 274 has been corrected to "CONVOLUTIONAL CODING". No new matter has been entered by these corrections.

Response to Claim Objections

The Examiner objected to numerous claims. In almost all cases, Applicant has amended the claim in accordance with the language suggested by the Examiner. Regarding the limitation "said soft decisions" in claim 1, 19, 26, 35, 49, Applicant submit that sufficient antecedent basis already exists in the claim, either in the preamble or the body of the claim.

Response to 35 U.S.C. § 102(c) Rejections

The Examiner rejected claims 1, 15, 18, 26, 35, 37-41, 43, 46-47, 49, 63 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,754,291 ("Okanoue et al."). Applicant respectfully submits that the prior art fails to disclose or suggest at least the step of modifying soft decisions in accordance with a combined noise power estimate to yield normalized soft decisions which are subsequently input to an outer decoder. Therefore, Applicant respectfully traverses the rejections and request favorable reconsideration.

While continuing to traverse the Examiner's rejections, Applicant, in order to expedite the prosecution, has chosen to clarify and emphasize the crucial distinctions between the present invention and the devices of the patents cited by the Examiner. Specifically, claim 1 has been amended to include a method of normalizing soft decisions obtained from an M -ary signal transmitted over a communications channel and subsequently input to an outer decoder, the method comprising the steps of generating a first noise power estimate based on a training sequence transmitted along with data over the communications channel, generating a second noise power estimate derived from the data transmitted over the communications channel, generating at least one performance based metric based on the reception of the training sequence or on the reception of the data, calculating a combined noise power estimate as a function of the first noise power estimate, the second noise power estimation and the at least one performance based metric and modifying the soft decisions in accordance with the combined noise power estimate so as to yield normalized soft decisions, the normalized soft decisions subsequently input to the outer decoder.

Okanoue et al. teaches a method of outputting a demodulation result for soft-decision decoding comprised of the steps of: (a) detecting a channel distortion of a received signal generated in a communication channel using a training signal contained in the received signal and a reference training signal, outputting a channel distortion data; (b) generating a distortion-based reliability data from the channel distortion data; (c) compensating the received signal using the channel distortion data, generating a compensated, received signal; (d) demodulating the compensated, received signal and deciding the received signal thus demodulated using a soft decision technique, outputting a decision result; and (e) outputting a demodulation result using the decision result and the distortion-based reliability data.

It is submitted that the Okanoué et al. teaches applying a received signal RS to the level detection circuit 1002, the demodulation circuit 1001 and the phase-reliability detection circuit 1006. The level detection circuit 1002 detects the level of the signal RS thus applied and outputs a receiving level signal RSL to the level normalization circuit 1003. The level normalization circuit

1003 is operative to normalize the level of the receiving level signal RSL on the basis of the decision result or demodulated data DD that is output from the demodulation circuit 1001. The normalization circuit outputs receiving level reliability data LR to a soft decision calculation circuit 1004. The "receiving level reliability" denotes the reliability relating to the receiving level of the received signal RS.

Okanoue et al. indicates that normalization is necessary since the decision result or demodulated data DD is a multi-valued demodulated data having different levels, the receiving level reliability is unable to be correctly estimated or evaluated from the receiving level itself. In other words, the receiving level reliability needs to be normalized.

The soft decision result calculation circuit 1004 receives the demodulated data DD, the phase-based reliability data PR and the level-based reliability data LR. It is operative to output demodulation data result DR applicable to the subsequent decoding operation.

It is submitted that a basic feature of Okanou et al. is that the normalization is performed using the demodulated data (DD), phase based reliability data (PR) and the receiving signal level (RSL) before soft values are generated.

In contrast, the noise normalization method of the present invention is operative to normalize soft values in accordance with the estimated noise power after the soft values are generated. Normalizing soft values after they are generated is significantly different than normalizing signals before they are generated. This feature is neither taught nor suggested by Okanou et al.

Applicant has reviewed the cited art and respectfully submits that the art fails to disclose or suggest the Applicant's claimed invention, and fails to teach each and every element and limitation of the claims rejected herein. Therefore Applicant respectfully traverses the rejections and requests favorable reconsideration.

It is believed that independent claims 1, 26, 35, 49 overcome the Examiner's § 102(e) rejection based on the Okanou et al. reference. In addition, it is believed that dependent claims 15, 18, 37-41, 43, 46-47, 63 also overcome the Examiner's rejection based on § 102(e) grounds. The Examiner is respectfully requested to withdraw the rejection based on § 102(e).

Response to 35 U.S.C. § 103(a) Rejections

Regarding claims 2-3, 29-30, 50-51

The Examiner rejected claims 2-3, 29-30, 50-51 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,754,291 ("Okanoue et al."). Applicant respectfully submits that the prior art fails to disclose or suggest at least the step of modifying soft decisions in accordance

with a combined noise power estimate to yield normalized soft decisions. Therefore, Applicant respectfully traverses the rejections and request favorable reconsideration.

For the reasons stated above, Applicant submits that claims 2-3, 29-30, 50-51 are not obvious in light of Okanou et al. The Applicant respectfully traverses the rejection of claims 2-3, 29-30, 50-51 and submits that the presently claimed invention is patently distinct over Okanou et al. The Examiner is respectfully requested to withdraw the rejection based on 35 U.S.C. §103(a).

Regarding claims 4-5, 16-17, 31-33, 36, 52-53

The Examiner rejected claims 4-5, 16-17, 31-33, 36, 52-53 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,754,291 ("Okanou et al.") in view of U.S. Patent No. 6,775,521 ("Chen"). Applicant respectfully submits that the prior art fails to disclose or suggest at least the step of modifying soft decisions in accordance with a combined noise power estimate to yield normalized soft decisions. Therefore, Applicant respectfully traverses the rejections and request favorable reconsideration.

Chen teaches a method for identifying a bad GSM speed frame and simultaneously maintaining a frame erasure rate below a specified value. The method is based upon a joint use of four signal quality metrics: (1) frame CRC parity check; (2) estimated burst signal-to-noise ratio; (3) estimated frame bit error count; and (4) stealing flag values of a frame. Another feature includes providing an improved estimated burst signal-to-noise ratio.

For the reasons stated above, Applicant submits that claims 4-5, 16-17, 31-33, 36, 52-53 are not obvious in light of the Okanou et al. and Chen references. The Applicant respectfully traverses the rejection of claims 4-5, 16-17, 31-33, 36, 52-53 and submits that the presently claimed invention is patently distinct over Okanou et al. in view of Chen. The Examiner is respectfully requested to withdraw the rejection based on 35 U.S.C. §103(a).

Regarding claim 42

The Examiner rejected claim 42 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,754,291 ("Okanou et al."). Applicant respectfully submits that the prior art fails to disclose or suggest at least the step of modifying soft decisions in accordance with a combined noise power estimate to yield normalized soft decisions. Therefore, Applicant respectfully traverses the rejections and request favorable reconsideration.

For the reasons stated above, Applicant submits that claim 42 is not obvious in light of the Okanou et al. reference. The Applicant respectfully traverses the rejection of claim 42 and submits

that the presently claimed invention is patently distinct over Okanoué et al. The Examiner is respectfully requested to withdraw the rejection based on 35 U.S.C. §103(a).

Regarding claim 45

The Examiner rejected claim 45 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,754,291 ("Okanoué et al.") in view of U.S. Patent No. 6,240,133 ("Summer et al."). Applicant respectfully submits that the prior art fails to disclose or suggest at least the step of modifying soft decisions in accordance with a combined noise power estimate to yield normalized soft decisions. Therefore, Applicant respectfully traverses the rejections and request favorable reconsideration.

Summer et al. teaches an adaptive equalizer capable of tracking rapid channel variations while maintaining high stability and low jitter, and a receiver constructed therefrom. A novel feature of the invention is that the equalizer is sectioned, that is constructed from a plurality of feed-forward sections and decision-feedback sections, where these sections comprise a cascade of an adaptive linear filter and an adaptive multiplier. This structure is effective at combating rapid channel variations, which are a result of delay variations of the reflections of the signal, e.g., airplane flutter, without sacrificing the stability and the accuracy of the equalizer even in cases where the equalizer has a large number of taps.

For the reasons stated above, Applicant submits that claim 45 is not obvious in light of the Okanoué et al. and Summer et al. references. The Applicant respectfully traverses the rejection of claim 45 and submits that the presently claimed invention is patently distinct over Okanoué et al. in view of Summer et al. The Examiner is respectfully requested to withdraw the rejection based on 35 U.S.C. §103(a).

Regarding claim 48

The Examiner rejected claim 45 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,754,291 ("Okanoué et al.") in view of U.S. Patent No. 6,522,704 ("Hatakeyama"). Applicant respectfully submits that the prior art fails to disclose or suggest at least the step of modifying soft decisions in accordance with a combined noise power estimate to yield normalized soft decisions. Therefore, Applicant respectfully traverses the rejections and request favorable reconsideration.

Hatakeyama teaches sequentially obtaining data of 384 symbols each (fundamental data) corresponding to a transmission rate on a communication line, by de-interleaving received data.

For the reasons stated above, Applicant submits that claim 48 is not obvious in light of the Okanou et al. and Hatakeyama references. The Applicant respectfully traverses the rejection of claim 48 and submits that the presently claimed invention is patently distinct over Okanou et al. in view of Hatakeyama. The Examiner is respectfully requested to withdraw the rejection based on 35 U.S.C. §103(a).

Based on the above arguments, it is believed that dependent claims 2-5, 16-17, 29-32, 36, 42, 45, 48, 50-53 overcome the Examiner's rejection based on § 103(a) grounds. The Examiner is respectfully requested to withdraw the rejection based on § 103(a).

Correction of Typographical Errors

Amendments have been made to correct grammatical and usage errors in the specification. No new matter has been added to the application by these amendments.

Conclusion

In view of the above amendments and remarks, it is respectfully submitted that independent claims 1, 19, 26, 35, 49 and hence dependent claims 2-18, 20-25, 27-34, 36-48, 50-63 are now in condition for allowance. Prompt notice of allowance is respectfully solicited.

In light of the Amendments and the arguments set forth above, Applicant earnestly believes that they are entitled to a letters patent, and respectively solicit the Examiner to expedite prosecution of this patent applications to issuance. Should the Examiner have any questions, the Examiner is encouraged to telephone the undersigned.

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Respectfully submitted,

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